Detail of Permian footprints *Chelichnus duncani* in sandstone from Dumfries and Galloway. Dumfries Museum and Camera Obscura. © Dumfries and Galloway Council Museums Service

Review of Fossil Collections in Scotland

Scotland South

National Museums Scotland

John Ellerman Foundation

Scotland South

Dumfries Museum and Camera Obscura (Dumfries and Galloway Council)
Sanquhar Tolbooth Museum (Dumfries and Galloway Council)
Stranraer Museum (Dumfries and Galloway Council)
Gem Rock Museum
Newton Stewart Museum
Tweeddale Museum (Live Borders)
Hawick Museum (Live Borders)

Dumfries Museum and Camera Obscura (Dumfries and Galloway Council)

Collection type: Local authority
Accreditation: 2018

The Observatory, Rotchell Road, Dumfries, DG2 7SW
Contact: dumfriesmuseum@dumgal.gov.uk

Location of collections
The original Museum was located in a windmill dating from the late 1700s, preserved in the 1830s by the newly-formed Dumfries and Maxwelltown Astronomical Society for use as an observatory. An extension built in the 1860s added a large gallery and mezzanine level with further gallery and storage space added in the 1980s. Collections are onsite in displays and a main storeroom.

Size of collections
1,000-1,200 fossils.

Onsite records
Information is in an Adlib CMS database transcribed from several previous electronic systems and various paper documents, such as MDA and other index card systems, Gift Books, Accession Registers, free text catalogues, inventories and listings. Fossils are catalogued with other geological material as a series of numbered boxes with a list compiled in the 1980s by James Williams (1944-2009). An online catalogue is available at: https://dgc-web.adlibhosting.com/home but does not yet contain fossil entries.

Collection highlights
1. Permian vertebrate trackways from Locharbriggs and Corncockle quarries linked to Reverend Henry Duncan (1774-1846) and former curator Alfred Truckell (1919-2007).
2. Fossils linked to Dr James Gilchrist (1813-1889) and William George Gibson (1828-1890), founders of the Museum, Dr Thomas Boyle Grierson (1818-1889) of Thornhill and James Watt (possibly the inventor born in Greenock; 1736-1819).

Published information
McKeever, P.J. (1994). The behavioural and biostratigraphical significance and origin of vertebrate trackways from the Permian of Scotland. *Palaios*. 9:477-487.
Several fossils are documented on the Future Museum website: http://futuremuseum.co.uk/

Collection overview
Fossils are almost entirely from the Permian or Carboniferous and from localities within the area of Dumfries and Galloway. The Permian is represented by approximately 20 slabs of sandstone showing vertebrate trackways, labelled as *Chelichnus*, *Saurichnus*, *Prochirotherium* and *Loxodactylus* from Locharbriggs and Corncockle quarries, Dumfries and Galloway; these include type specimens (Fig. 59). The collection also holds the type specimen of *Prochirotherium truckelli* from Corncockle Quarry, named after Alfred Truckell and *Chelichnus locharbriggsensis* from the Locharbriggs Quarry. Carboniferous fossils are numerous and diverse with the displays providing an overview: Brachiopods *Gigantoproductus, Rhynchonella*, *Productus* and spiriferids among others, bivalve *Carbonicola* from a mussel band, several nautiloids (Fig. 60), such as *Actinoceras*, corals *Aulophyllum*, *Lithostrotion* and *Lonsdalia,* shark tooth plate, and plants *Sigillaria*, *Cyclopterus*, *Pecopterus* and *Ulodendron* from localities including Closeburn, Muirburn and Arbigland; a *Terebella*/part of a dentalium (old label) is from Kelhead. A slightly expanded diversity of taxa (crinoids, fish, coprolites, additional corals, brachiopods and bivalves, and gastropods, notably *Bellerophon*) form the collections in storage. Several specimens are oversize: a large colonial coral, plants (*Stigmaria*, *Lepidodendron*, etc), brachiopods (*Productus*) and orthoconic nautiloids. The

Carboniferous from other areas of Scotland is represented by fossils of the fish *Rhizodus* from Gilmerton, near Edinburgh.

Figure 59: Holotype of the Permian *Prochirotherium truckelli* trackway from Corncockle Quarry, Dumfries (image used courtesy of Dumfries Museum)

Fossils from other stratigraphic levels are the ichthyosaur in a wooden frame, perhaps a juvenile but still more than a metre long, and fish in sandstone from the Upper Devonian of Dura Den. A block is noted with a handwritten label reading ‘Grierson early turtle’, the name referring to Thomas Boyle Grierson (1813-1889) whose museum was located in Thornhill and the material from which ended up in Dumfries Museum and Camera Obscura among other locations. Several boxes have mixed rock, mineral and fossil content; fossils of the bivalve *Plagiostoma* (Liassic, Lower Jurassic) and echinoids suggest fossils from the Jurassic are also present.

Research/collection links

The ‘Grierson early turtle’ would be worth investigating to confirm if what seems to comprise a series of overlapping plates is the fused shell of a turtle or another form of reptile. The ichthyosaur fossil, likely to be from the Lower Jurassic of England or Germany, could also be studied.

Figure 60: A Carboniferous nautiloid from Closeburn (image used courtesy of Dumfries Museum)

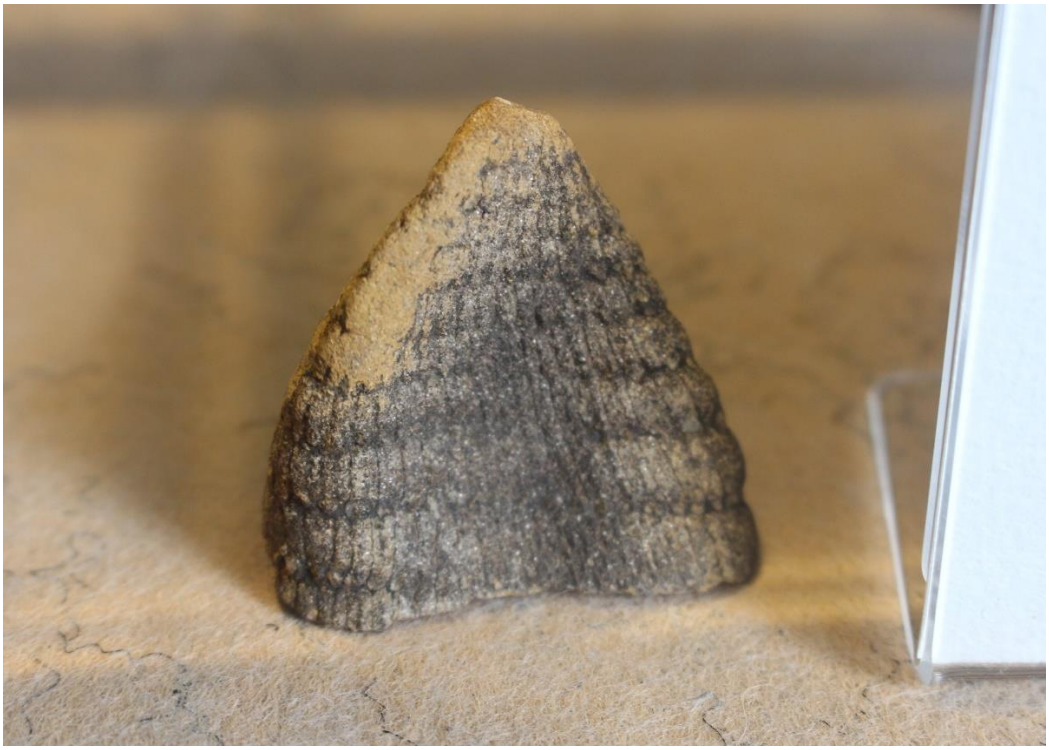

Figure 61: A Carboniferous fossil labelled as the solitary coral *Palaeosmilia*, perhaps the growing tip of the plant *Calamites*, in Sanquahar Tolbooth Museum (image used courtesy of Dumfries Museum)

Sanquhar Tolbooth Museum (Dumfries and Galloway Council)

Collection type: Local authority
Accreditation: 2018

High Street, Sanquhar, Dumfries, DG4 6BN
Contact: dumfriesmuseum@dumgal.gov.uk

Location of collections
The Museum is in a former tolbooth built in 1731 with uses since as a jail and town council chambers. The collection is onsite in displays across two first floor rooms and a small storage area.

Size of collections
Seven fossils on display, no more than two in storage.

Onsite records
Fossils are included in documentation at Dumfries Museum and Camera Obscura.

Collection highlights
1. Fossils potentially linked to Dr Thomas Boyle Grierson (1818-1889) of Thornhill.
2. Fossils collected through the local coal mining industry.

Published information
Several fossils are documented on the Future Museum website: http://futuremuseum.co.uk/

Collection overview
Fossils are all Carboniferous and from the local area: Plants (*Neuropteris*, large *Stigmaria* from Libry Moor, Kirkconnel, *Calamites* and slab of *Lepidodendron*), bivalve *Carbonicola*, a fossil labelled as the coral *Palaeosmilia* that might be better interpreted as the growing tip of the Carboniferous plant *Calamites* (Fig. 61), and a specimen with what is identified as an amphibian vertebra. One of the larger fossils seems to have been cut by machinery, suggesting collection through the local coal mining industry. The fossils are accompanied by interpretive text and a further sheet showing a geological map of the area. A fossil plant (stem or trunk) and gastropod (probably also Carboniferous) are in storage.

Stranraer Museum (Dumfries and Galloway Council)

Collection type: Local authority
Accreditation: 2018

55 George Street, Stranraer, Dumfries and Galloway, DG9 7JP
Contact: stranraermuseum@dumgal.gov.uk

Location of collections
The Museum building is on the main street in the former town hall built in 1776. No fossils are on display; all specimens are in an offsite store located a few minutes from the Museum.

Size of collections
55-60 fossils.

Onsite records
Catalogue on Adlib CMS.

Collection highlights
1. Fossils from Dumfries and Galloway.

Collection overview
The oldest fossils represent the Ordovician, with a box containing eight samples of the graptolites *Dicellograptus* from the Ordovician Hartfell Shale, and *Monograptus*, *Climacograptus* and *Rastrites* from the Silurian Birkhill Shale at Dob's Linn, Dumfries and Galloway. Labels indicate these might have been used in a previous display. Additional graptolite samples include one labelled as part of the Anderson Collection with other similarly labelled fossils; these are attributed to RSG Anderson (1867-1939) who was linked to Wigtown District Museum. Carboniferous plants include variably sized *Lepidodendron* and *Stigmaria*, smaller coalified pieces and multiple fragments in a sandy matrix. Invertebrates include a gastropod, corals (some might be Silurian), large productid brachiopod and crinoidal Limestone. Other fossils are the several ammonites (probably Jurassic, more specifically Liassic), bivalves (Mesozoic), sandstone with shell fragments, a sample of mudstone with bivalves, flint with a plant and worm casts in mudstone.

Gem Rock Museum

Collection type: Independent

Chain Road, Creetown, Dumfries and Galloway, DG8 7HJ
Contact: enquiries@gemrock.net

Location of collections
The current Museum, which opened in 1981, is the third museum on the same site. The collection was started 80 years ago by the father of the current owner, with many specimens collected in the field and others purchased, donated and exchanged. Collections are located in various rooms onsite, acting as both display and storage; all specimens are in public view.

Size of collections
Approximately 150 fossils.

Onsite records
All specimens are listed in an Excel spreadsheet by image; specimens are not numbered.

Collection highlights
1. Fossils represent important and well-known localities from around the world.

Collection overview
Fossils were chosen for display and therefore cover many taxonomic groups, stratigraphic levels and geographic localities worldwide (Fig. 62). Fish are from the Devonian Sandwick Fish Bed and other sites across north east Scotland, Brazil (Cretaceous Santana Formation), and a large slab covered with *Knightia* from the Green River Formation of Wyoming, USA. Shark teeth and a coprolite attributed to a shark are also present. Reptiles include a mosasaur tooth, *Spinosaur* tooth and dinosaur egg labelled as 90 million years old from Yunnan, China. Mammals are represented by various fragments: a bison leg bone, cave bear tooth, two mammoth teeth (from a gravel pit in Bawsey, donated 1972, and another from Aniak, Alaska), a long limb bone from a mammoth, walrus jaw and a cave bear skeleton (called Olga). A creodont skull has an age of 30 million years ago (Oligocene). A bone fragment is identified as a hominid thigh (femur) from the Olduvai Gorge in Tanzania c.1970, close to the area investigated by the palaeoanthropologists Louis Leakey (1903-1972) and his wife Mary Leakey (1913-1996), who discovered many early hominin remains and are noted for work on human evolution in Africa. It might be a specimen left from one of the previous museums but could have been collected by Joe Craig (in Africa) or George Hinchliffe (detail provided verbally).

Invertebrate fossils include trilobites from Utah (Cambrian *Elrathia*) and Morocco, ammonites (*Hamites* and *Dactylioceras* from the Liassic (Lower Jurassic) of Whitby and the Isle of Skye, and Germany), polished Devonian orthoconic nautiloids, belemnites, ammolite (opalescent mollusc shell), brachiopods of various ages, bivalves (Jurassic *Gryphaea* and *Inoceramus* from Cheltenham), Thalassinae (crustacean from Gunn Point, Australia), coral, echinoid (*Ensope calcus*), beetle in tar from Pennsylvania, and a specimen labelled as a mayfly but probably a March fly, although age details are needed to confirm this. Sedimentary rocks contain the bivalves *Turritella* and *Pecten*, a sample of Crag with shell fragments, crinoidal limestone and densely packed corallites in Frosterley Marble from Durham.

Plants, although limited to a few taxa, are represented by multiple *Lepidodendron* and *Stigmaria* and leaves, almost certainly from the Eocene Green River Formation among other origins. Several large trunk cross-sections and logs might be from Arizona. A polished slab is a stromatolite – a sedimentary structure formed by cyanobacterial growth in shallow water - from the Middle Devonian of Orkney (Fig. 63). A label describes the fossil record of stromatolites and similar structures.

Figure 62: A display showing a variety of fossils (Gem Rock Museum)

Figure 63: Polished Devonian stromatolites from Orkney known as ‘Horse-tooth stone’ (Gem Rock Museum)

Newton Stewart Museum

Collection type: Independent

York Road, Newton Stewart, Dumfries and Galloway, DG8 6HH
Contact: themuseumns@gmail.com

Location of collections
A former church building divided into 25 themed sections that form both the displays and storage of the collection.

Size of collections
20-30 fossils.

Onsite records
Information for the collections, including fossils, is in a Modes database.

Collection highlights
1. Fossils potentially linked to Herbert Maxwell (1845-1937), politician, antiquarian and naturalist.

Collection overview
Fossils are from various stratigraphic levels: Silurian bryozoan *Fenestella* and crinoid, the Carboniferous brachiopods *Productus*, *Eomarginifera* in limestone from Great Ormes Head, *Overtonia* and *Plectodonata*, crinoid stem from the Carboniferous of Fife, the Triassic bivalve *Chlamys*, two examples of the Upper Liassic (Lower Jurassic) bivalve *Nuculana*, the ammonites *Echinoceras* (Lower Jurassic) and *Sigaloceras* from the lower Callovian (Middle Jurassic), the Cretaceous gastropod *Natica*, a worn tooth of the shark *Anacorax* and coral *Isastrea* from Helmsdale, Sutherland. The fossil labelled as both an Ordovician graptolite and from the 'Upper Devonian … Devon' is probably the fragments of a Devonian plant. A piece of mudstone labelled as 'impression of lenses or footprints' from an unknown locality is probably not a fossil, and a final label reads 'portion of an uncertain bivalve, unknown locality'. There are also four ammonites most likely from the Liassic (Lower Jurassic), four *Gryphaea* from a similar level (labelled as univalves = bivalves), a fragment of a belemnite guard, single shell of the gastropod *Murex* and an elephant tooth.

Tweeddale Museum (Live Borders)

Collection type: Local authority (Live Borders)
Accreditation: 2019 (Provisional)

Chambers Institute, High Street, Peebles, EH45 8AG
Contact: enquiries@liveborders.org.uk

Location of collections
The Museum is located in the Chambers Institute, known previously as Dean's House and as the Queensberry House before 1775. The Institute was remodelled with the bequest of locally-born William Chambers (1800-1883) and opened in 1859 to provide a library, museum and hall for the Peebles community; an extension funded by Andrew Carnegie (1835-1919) opened in 1912. At one point all the rooms housed displays. The collections today are onsite in two main galleries and storage on a balcony level and adjoining rooms.

Size of collections
358 fossils.

Onsite records
The catalogue is a centralised Vernon system with entries from the four museum collections managed by Live Borders (indicated by prefixes). The original entry forms are present (redone in the 1980s) with 'quick check lists' available.

Collection highlights
1. Range of fish fossils from Scotland, UK and worldwide.
2. Collection of Carboniferous invertebrate fossils.
3. Pennsylvanian (Carboniferous) fossils from Kansas and Illinois.

Published information
Turner, R. (1927). *Descriptive catalogue of the Geological Collection in the Chambers Institution, Peebles*. Edinburgh: James Thin.

Collection overview
Vertebrate fossils include the Carboniferous fish *Rhizodus*, *Elonichthys*, *Rhadinichthys* and *Amblypterus*, the Triassic ray-finned fish *Birgeria*, Jurassic coprolite and vertebra(e) labelled as ichthyosaur, palatal teeth of the Jurassic-Cretaceous *Mesodon* (now *Typodus*), fossils described as spines, scales and/or bones of a Cretaceous ganoid or placoid fish, various shark teeth (*Odontaspis*, *Otodus*) and a cast of a fossil fish. A moderate-sized (70cm) fossil in an old wooden frame is labelled as '*Lepidotus semisonatus* from the Jet rock, Upper Lias, Whitby. Presented by Mr John Mc[Man]'; the fish and casing require conservation. Further specimens of the Cretaceous *Lepidotus* include teeth, fragmentary bone bed material, and fragments associated with the bivalve *Filosina*. Other vertebrate fossils are a 'fish bone embedded in rock' that might be reptile on investigation, and samples from the Westbury bone bed (Rhaetian (Triassic) Westbury Formation) and Ludlow Bone bed (Ludlow Series, Silurian).

Most of the fossils are invertebrates, the oldest of which are the annelid burrows in the basal Cambrian Pipe Rock. Graptolites (*Retiolites*, *Climacograptus*, *Monograptus*, *Diplograptus*, *Rastrites*, *Nemagraptus*, *Didymograptus* and *Dicellograptus,* some represented by several species, especially *Monograptus*) are Ordovician and Silurian. The Trilobites *Ogygia*, *Dalmanites* and *Phacops* among others are from the Ordovician, Silurian and Devonian. Corals tend to represent the Palaeozoic with wide-ranging species including *Thamnopora*, *Palaeosmilia*, *Endophyllum*, *Amplexus*, *Alveolites*, *Siphonophylla* and *Clisiophyllum*; *Heliolites*, *Favositella*, *Favosites*, *Acervularia*, *Halysites*, *Chonophyllum* from the Silurian; *Zaphrentis* and *Cystiphyllum* from the Devonian; *Cyathophyllum*,

Aulophyllum and *Lithostrotion* from the Carboniferous. A Devonian coral from outside the UK is labelled *Smithia* (?*Haplothecia*). An unusual specimen is the reworked coral eroded from rocks of the Devonian and redeposited with Triassic sediments. Brachiopods include Ordovician *Dinorthis*, *Heterorthis* and other orthids, Silurian *Conchidium* (=*Pentamerus*), Carboniferous *Productus*, *Schizophoria* and *Spirifera*, Jurassic *Goniorhynchia* and Cretaceous *Orbirhynchia*, with wide-ranging *Athyris* and *Rhynchonella*. Palaeozoic molluscs are limited to the bivalves *Carbonicola*, *Sanguinolites* and *Edmondia* and gastropod *Bellerophon* from the Carboniferous.

Figure 64: Calyx (head) of a crinoid from the Pennsylvanian (Carboniferous) of Illinois, noted as rare (Tweeddale Museum, Live Borders)

For the Mesozoic and Cenozoic, most of the fossils are molluscan. Bivalves (lamellibranchs) include the Triassic *Rhaetavicula* (Westbury Formation), Jurassic *Plagiostoma* (Liassic), *Gervillia,* and Cretaceous *Epicyprina, Filosina*, *Thetis* (Greensand) and *Spondylus* (Chalk), with *Avictopecten*, *Myalina*, *Cardium* and *Homomya*, and long-ranging taxa *Modiolus*, *Modiola*, *Protocardia, Ostrea, Liostrea, Pholadomya, Pecten, Pinna* and *Chlamys* present. Bivalve shell beds are from the Greensand (Cretaceous). Gastropods include the Palaeozoic *Euomphalus, Murchisonia* and *Naticopsis*, Liassic *Pleurotomaria*, Portlandian *Aptyxiella* (Portland screw), Gault *Jurassiphorus*, Cenozoic *Solarium* and long-ranging *Loxonema* (Palaeozoic-Triassic) and *Viviparus* (Mesozoic-Cenozoic). Ammonites are from the Lower Liassic (*Psiloceras, Oxynoticeras*), Middle Liassic (*Oxynoticeras*, *Paltopleuroceras*), Upper Liassic (*Harpoceras, Phylloceras, Dactylioceras*, *Hildoceras*), Greensand (*Parahoplites*), Gault (*Euhoplites*), Chalk (*Schloenbachia*, *Calycoceras*), with *Aspidoceras*, *Amoeboceras*, *Arnioceras*, *Asteroceras*, *Peronoceras*, *Amaltheus*, *Hildaites*, *Pseudolioceras*, *Eleganticeras*, *Porpoceras*, *Calaceras*, *Schloenbachia*, *Gagaticeras*, *Turrilites*, *Arietites*, *Seguenziceras* (synonym of *Arieticeras*), *Polygrammoceras* and *Acanthoceras* (from France); localities include Whitby and some specimens are cut to show internal structure. Two well-preserved *Kosmoceras* in matrix are from the Oxford Clay (Jurassic) with the label affixed mentioning the locality of Christian Malford in Wiltshire, well-known as a source of exceptionally

preserved cephalopods with a range of soft tissues. Fragments of belemnites (one cut to show chambers) and examples of the nautiloids *Nautilus* and *Orthoceras* are also present.

Echinoderms are represented by the crinoids *Encrinus* (Palaeozoic-Mesozoic), *Poteriocrinus* (Devonian-Permian) and disarticulated stems from various ages (Carboniferous, Jurassic), and the Cretaceous echinoids *Echinocorys*, *Echinus* and *Micraster*. Other specimens are a slab of pale rock with a note 'Starfish *Urastrella* sp, Pennsylvanian, Kansas City, Kansas' and a crinoid calyx and arms in matrix (Fig. 64) labelled 'Unidentified crinoid, La Salle Fm, Pennsylvanian, Pontiac, Illinois, very rare', both worth investigating. Other fossils without stratigraphic information are crustacean arthropods (*Anthrapalaemon*, *Pseudogalathea* and *Hoploparia*), numerous silicified/opalised fossil wood, *Stromatopora*, fossil sponge and *Serpula* worm tubes. Casts are of an ichthyosaur front paddle, the Precambrian (Ediacaran) frond *Charnia* and a dinosaur skull.

Plants are mainly Carboniferous: *Neuropteris*, *Stigmaria*, *Calamites*, *Sigillaria*, *Lepidodendron*, *Pecopteris* and *Sphenopteris*, a fern from Saltwick near Whitby (Jurassic), and samples of Rhynie Chert containing the silicified remains of a Devonian ecosystem found near Huntly, Aberdeenshire.

Research/collection links

Investigations of the Pennsylvanian (Carboniferous) fossils from Kansas and Illinois are suggested to determine their historic and/or scientific importance. There is also a relatively large amount of fish material, especially from the Jurassic and Cretaceous, and it would be interesting to know how it was acquired as most of the specimens are from southern England or beyond. This could be the subject of a project including other fossil fish from the Live Borders collection, housed at Hawick Museum.

Hawick Museum (Live Borders)

Collection type: Local authority (Live Borders)
Accreditation: 2019 (Provisional)

Wilton Park Lodge, Hawick, Scottish Borders, TD9 7JL
Contact: enquiries@liveborders.org.uk

Location of collections
Hawick Museum is located in an historic 18th century mansion house in Wilton Park. It became home to the town's museum in 1910, making it the oldest museum in the Scottish Borders. The collection is onsite across displays and storerooms on several floors.

Size of collections
300-500 fossils.

Onsite records
The fossils are listed in a Vernon document shared by four Live Border museums. MDA cards are present in metal drawers and there are several accession books, the first of which dates from the 1970s. Rapid file inventories were created in Vernon 15 years ago for each storeroom.

Collection highlights
1. Fish fossils from across Scotland, the UK and worldwide.

Published information
Agassiz, L. (1844–1845). *Monographie de poissons fossiles des Vieux Gres Rouges ou Systeme Dévonien (Old Red Sandstone) des Îles Britanniques et de Russie.* Neuchâtel: Soleure, chez Jent and Gassmann.

Collection overview
Fossils are organised taxonomically for the most part. Vertebrates are represented mainly by fish, including Middle Devonian fish scales of a *Coccosteus* from Nairn and fragmentary fish remains from Cromarty and Moray, Upper Devonian *Holoptychius* from Dura Den (old blue label) and possible specimens from Jedburgh (Scottish Borders), a Carboniferous *Gyracanthus* spine from Burdiehouse, acanthodian spine fragments from other localities and *Chonetodus* from the Carboniferous Limestone of Bristol. The Jurassic is represented by *Acrodus* bone fragments and framed *Chondrosteus* tail from Lyme Regis, a *Dapedius* and a *Leptolepis* from the Liassic of Dumbleton, the Eocene by *Knightia* from the Green River Formation of Wyoming, and the Cretaceous by fish in Chalk. Several shark teeth are also present. The label affixed to one fish reads '*Palaeoniscus comptus'*, a misspelling of *Palaeoniscum comtus*, from the Permian of Ferry Hill, Durham. Further notation on the label ('ag') suggests the specimen is figured by Agassiz (1833). A label reading 'Pappenheim' suggests a fish from the Jurassic Solnhofen Limestone of Germany. Other specimens are a bone breccia, rostrum of a reptile (cut and polished to show the cross section), two bones that are possibly sub-fossil, a small whale vertebra and a specimen labelled as vertebrate that might be plant. There is a cast of an *Archaeopteryx* from the Solnhofen Limestone.

A small box labelled fossil fish contains a selection of interesting specimens: Three *Diplomystus* from the Eocene Green River Formation of Wyoming, shark teeth (*Galeocoda*, *Sphyrna*) from the Miocene Tampa Limestone of Florida, a Perspex case of shark teeth from the Eocene Barton Clay, a *Leptolepis talborgensis* from the Triassic West Pennant Hills of New South Wales, Australia, a fish in Chalk, two fragments that could be *Dipterus* or *Osteolepis* from the Devonian of north east Scotland, and three further fish specimens without labels. A matchbox labelled as 'bone fossil,

Eocene Green River Shale from Dairy Fork, Utah' contains a very small but apparently complete fish skeleton (Fig. 65).

Figure 65: A 1cm long fish from the Eocene Green River Shale, Dairy Fork, Utah (Hawick Museum, Live Borders)

Invertebrate fossils include Ordovician graptolites labelled as Dob's Linn and the Upper Birkhill Shale (in part Silurian) (Fig. 66). A single specimen contains two-dimensionally and three-dimensionally preserved graptolite stipes. Corals are often cut and polished to show morphological features with examples from the Silurian, Carboniferous (*Lithostrotion*) and Cretaceous, etc. Brachiopods are represented by numerous specimens, notably from the Carboniferous (productids, rhynchonellids and spiriferids with localities including Dukes Quarry, Langholm), Ordovician (possibly from Girvan and other localities), Silurian (Much Wenlock Limestone Formation) and Chalk (terebratulids among others). Bivalves are equally diverse, being from the Carboniferous (isolated fossils and several shell beds, including a mussel band), Jurassic (*Trigonia*, *Gryphaea,* inoceramids, shell beds, Oxford Clay from Weymouth, Greensand), Chalk (isolated fossils and shell beds) and Recent. Samples of siltstone with Ordovician bivalves are potentially from Girvan or equivalent stratigraphic level. Gastropods are represented by fossils from the Greensand and a series of small (less than a centimetre) fossils presented with a Carboniferous plant fossil. Sandy-coloured blocks with indeterminate but high-density bivalve and gastropod fossils are better described as sedimentary rocks. Trilobites (*Calymene*), bryozoan (*Fenestella)* and sponges are represented by a very limited number of specimens. Similarly, there is a small number of echinoderms, mainly crinoids from the Carboniferous, echinoids from the Chalk, and 5 asteroids, including two small *Aspideria scutelaria* starfish. Cephalopods include various goniatites, ammonites (*Hildoceras* from Whitby), nautiloids (coiled and orthoconic) and belemnites, some with old labels. Trace fossils are present: A *Nereites*, a possible *Helminthopsis* and block of mudstone with trace fossils that might be Jurassic.

Plants are limited to a few taxa, such as *Calamites*, *Glossopteris, Neuropteris* and types of fern, etc, from the Carboniferous with one labelled Lower Jurassic of Whitby; multiple specimens of each fossil taxon are present.

Fossils on display are not generally local. There is a coral limestone from Torquay, impression of a plant stem in Carboniferous Fell Sandstone Formation from Dumfries and Galloway, a Carboniferous fern, Cretaceous echinoderm from Kent, *Equisetum* from Liddel Water, Jurassic ammonite from Cleveland, echinoid fossils in chalk, the trace fossil *Crossopodia* from Longformacus, Berwickshire, graptolites from Dob's Linn, a trilobite from the Much Wenlock Limestone Formation of Dudley, fossil fish from the Eocene Monte Bolca, a second fish from the Permian of Ferry Hill, County Durham, and an ammonite cut and polished to show crystal-lined internal chambers. Boxes labelled 'handling' contain mixed crinoids, sea urchins (echinoids), Carboniferous plants, corals, ammonites (cut and polished) and belemnites (isolated fragments).

Research/collection links

Specimens worth further investigation are the selection of fish fossils from around the world, notably the *Leptolepis talborgensis* from the Triassic of Australia with label reading 'locality now closed – hard to get to. Rare and collectable'. This could form a project including the relatively large and diverse fossil fish collection held at the Tweeddale Museum. Correspondence between Hawick Museum and the Hancock Museum in Newcastle identifying specimens as the scales of *Holoptychius* might relate to a tray of several sandstone samples with fossil fragments and would be worth following up.

Figure 66: Graptolite fossils from the Ordovician-Silurian section at Dob's Linn, Dumfries and Galloway (Hawick Museum, Live Borders)